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Air Education and Training Command

Sustaining the Combat Capability of America's Air Force



ALTUS AFB ASSAULT LANDING ZONE STUDY II MORSS 2005

U.S. AIR FORCE

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Overview



- **Study Objective**
- **Background**
- **Approach**
- **Time in System and Graduate Program Requirements Document**
- **Limitations**
- **Assumptions**
- **Scenario Description**
- **Results**
- **Conclusion**
- **Future Studies**





Study Objective



**Does the proposed increase in C-17s
at Altus AFB drive a requirement for
an additional ALZ?**



Background



- Dec '01 – Congress authorized AF 180 C-17s by end of FY07– an additional increment to 222 may be authorized
 - Altus AFB fleet grows to 15 C-17s by FQ08/1; 18 C-17s by FY11 if 222 authorized
- May '02 – 97th AMW stated the increase drives a requirement for an additional ALZ
 - Pattern saturated on existing ALZ due to conflicting traffic on East runway
- Jul '02 – AMC as lead command refused the \$16.0M funding line for a new ALZ
 - Stated traffic congestion can be handled through better scheduling



Modeling Approach



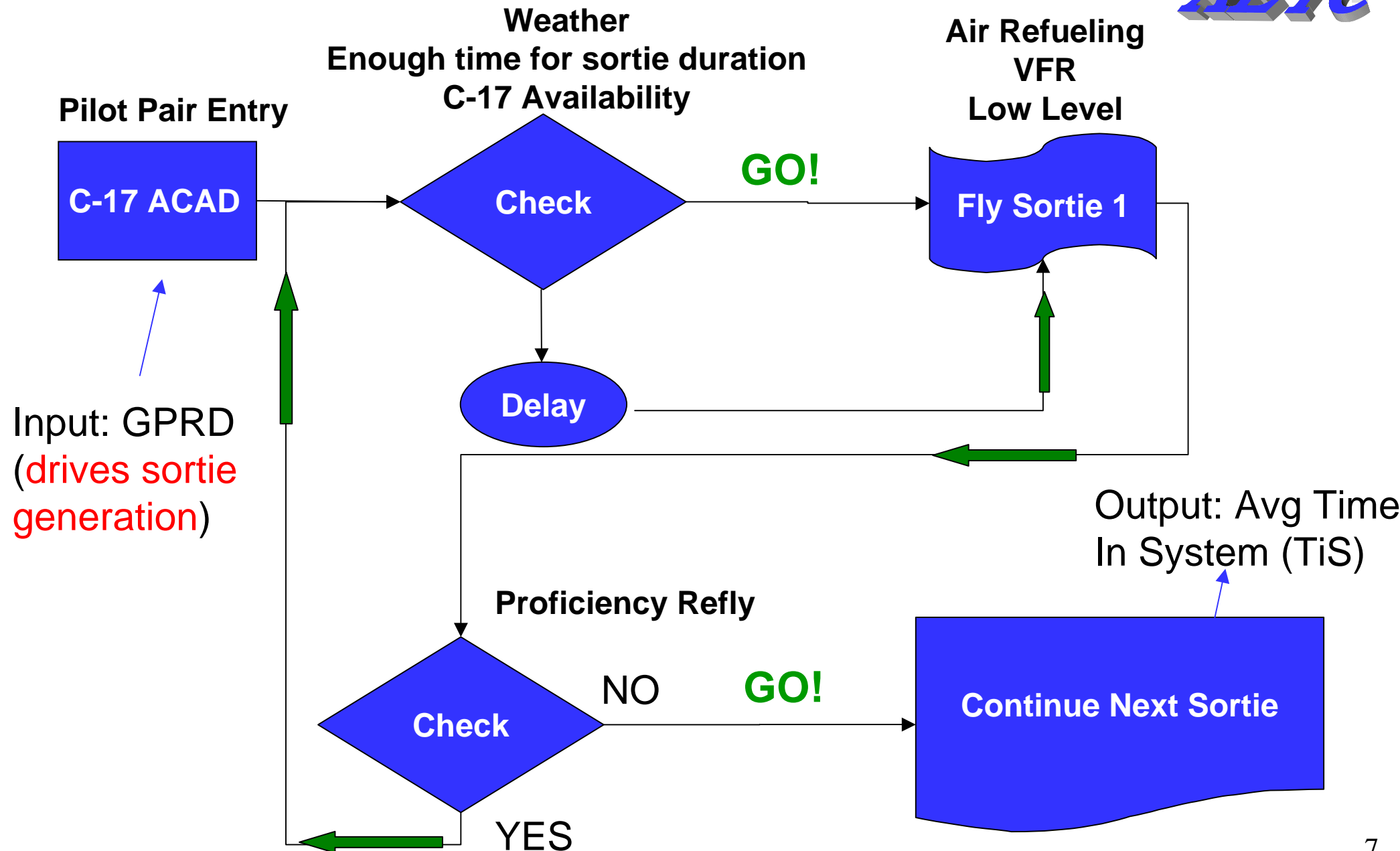
- Simulated entire flying process for 3 platform training tracks (C-17, KC-135, & C-5) from FY07 through FY11 – ran 1K times each for a total of 5K simulated years
- 26 pilot types modeled with their respective missions (e.g., Aircraft Commander Air Drop, Aircraft Commander Air Refueling, Instructor Pilot Continuation Training, etc.)
 - 12 C-17 types, 7 C-5 types, & 7 KC-135 types
- Factors modeled: VFR, IFR, LL & AR patterns; crew rest; weather; sunrise/sunset; scheduled and unscheduled maintenance; proficiency reflies



Approach Modeling Methodology



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Understanding TiS and GPRD



- If TiS is beyond the allotted time → saturated
- If GPRD is not met (entry \neq grads) → saturated
- If TiS is within the allotted time and GPRD is met (entry = grads) → not saturated
- How is a pattern saturation issue determined?
 - Vary resource constraints for C-17, VFR, and Tactical
→ Increased resource capacity, should result in TiS decrease
- TiS decrease implies that *wait time* for a particular resource (i.e., C-17) is directly affected by increased resource
- TiS unchanged implies that increased resource is not the reason for any *wait time*



Model Limitations



- Constant Day – sunrise/sunset do not vary -- minor
- NVG & C-17 Tactical landings not modeled
 - NVG requirements not yet defined
 - C-17 high-speed tactical landings not supported by current Altus ALZ



Assumptions



- Primary model input: Student/IP GPRD requirements
- General
- Re-fly Factors
- Maintenance
- Weather
- C-17 specific
- KC-135 specific
- BASH
- Resource Capacity



Scenario Description



- **Baseline** – Current Altus AFB resources; 15 C-17s (8-5); VFR at Altus (4)
- **Baseline with Aux ALZ** (new ALZ) – C-17 VFR accomplished at Aux ALZ & Altus AFB (7);

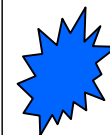
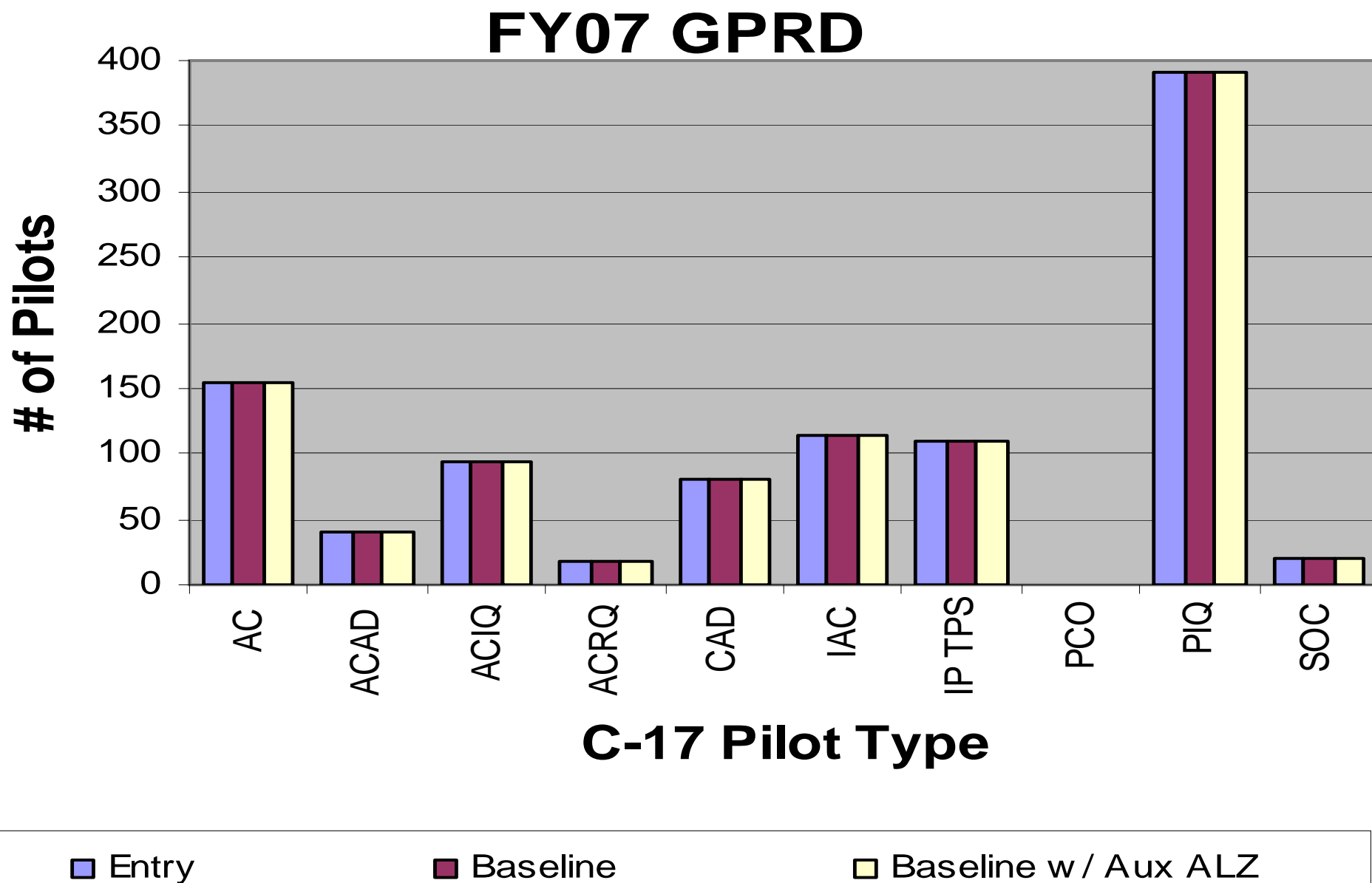


Simulation Results



Simulation Results

C-17 FY07 GPRD Entry/Grad





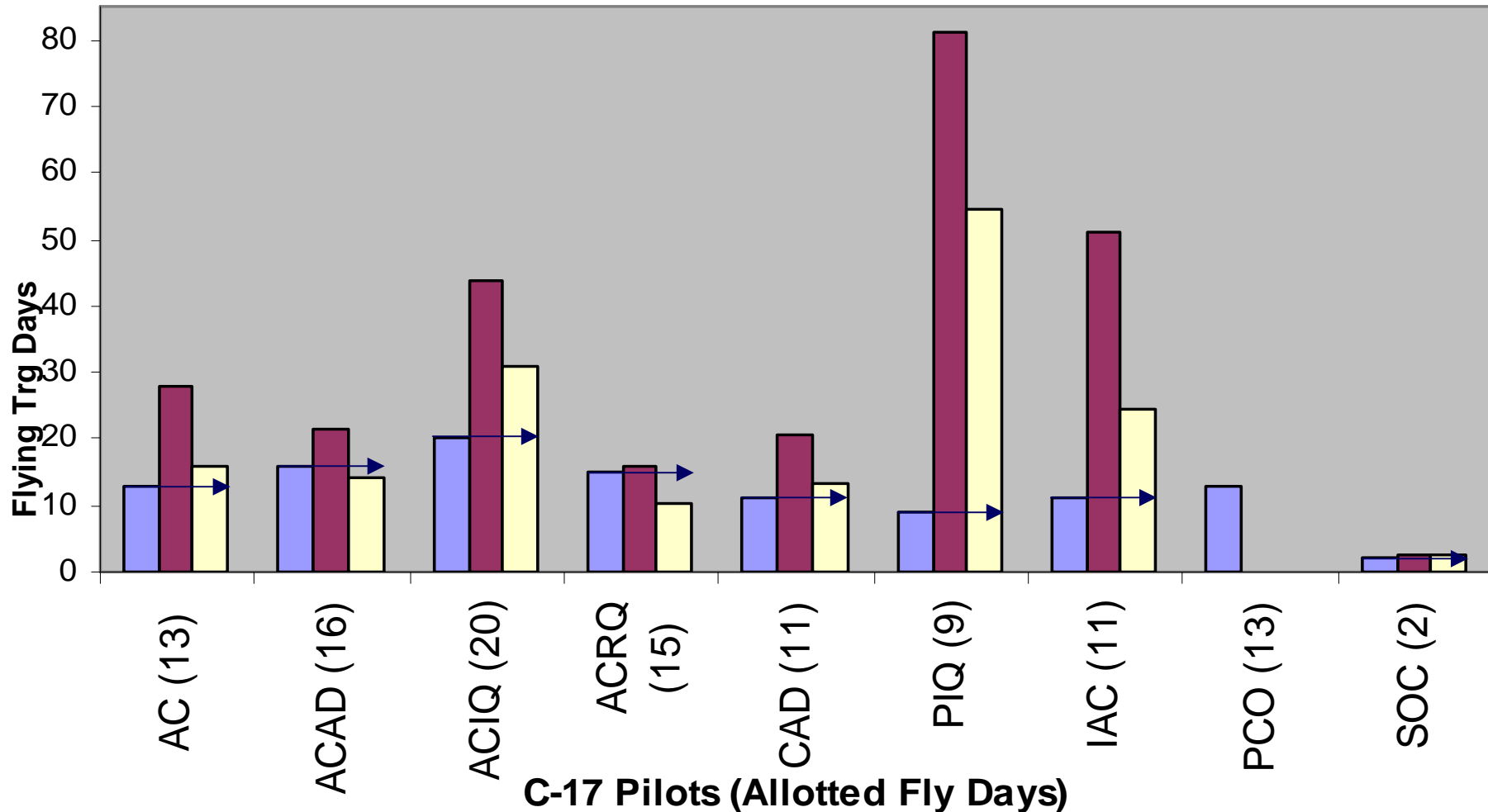
Simulation Results

C-17 FY07 TiS Comparisons



AEPC

FY07 Time In System



■ Max Desired Flying Days

■ Baseline

■ Baseline w/ Aux ALZ



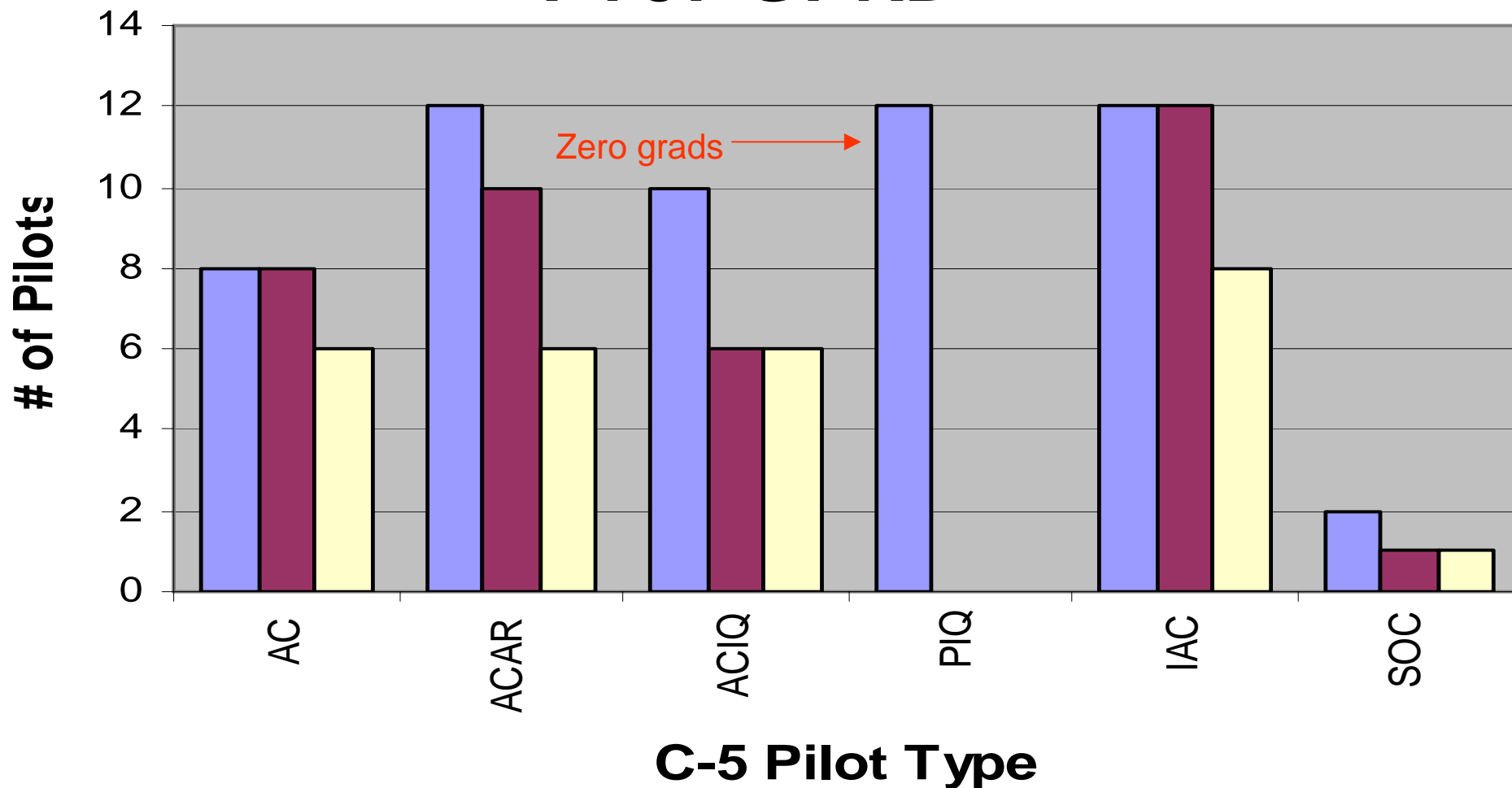


Simulation Results

C-5 FY07 GPRD Entry/Grad



FY07 GPRD



Entry

Baseline

Baseline w / Aux ALZ



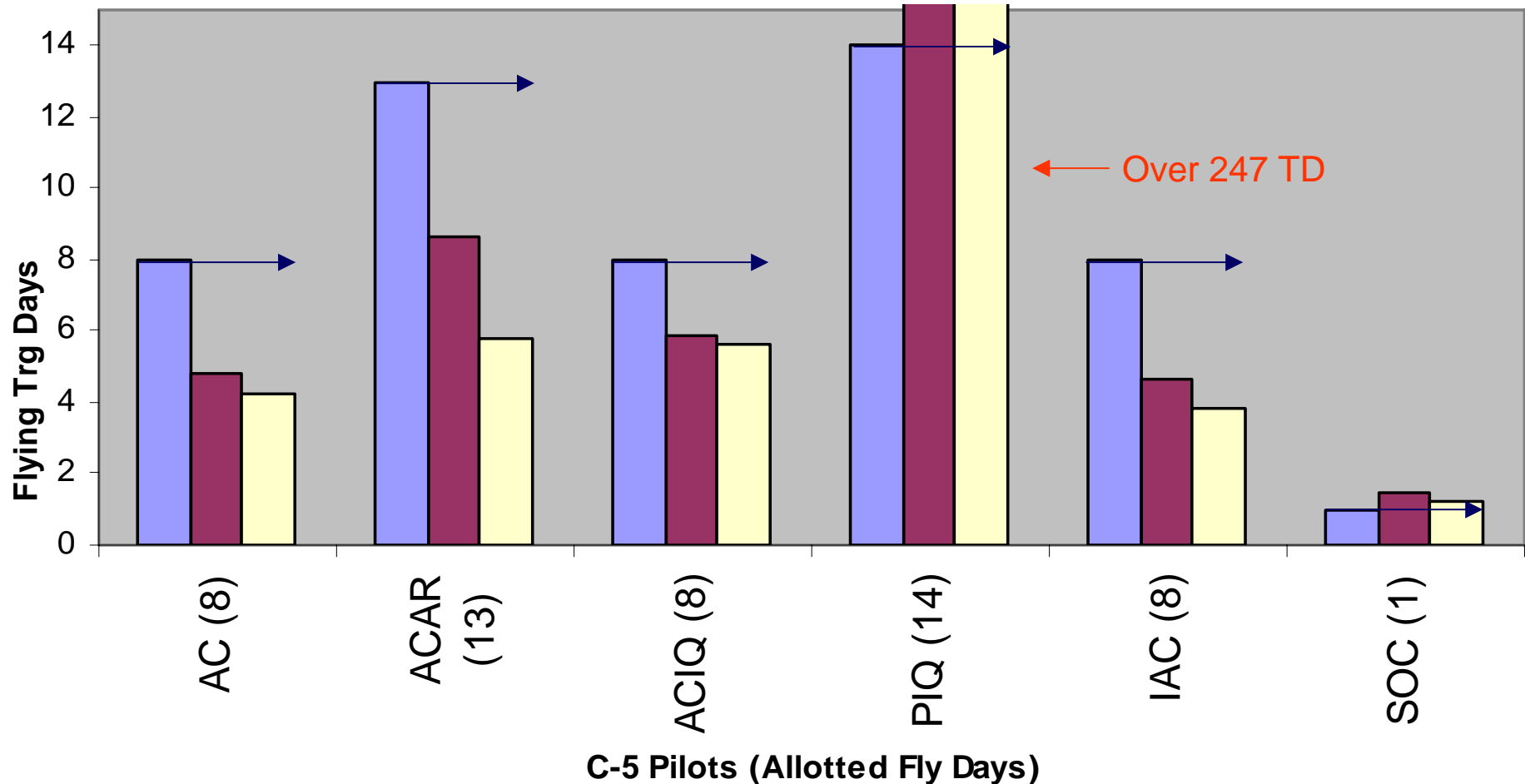
Simulation Results

C-5 FY07 TiS Comparisons



AETC

FY07 Time In System



■ Max Desired Flying Days

■ Baseline

■ Baseline w/ Aux ALZ



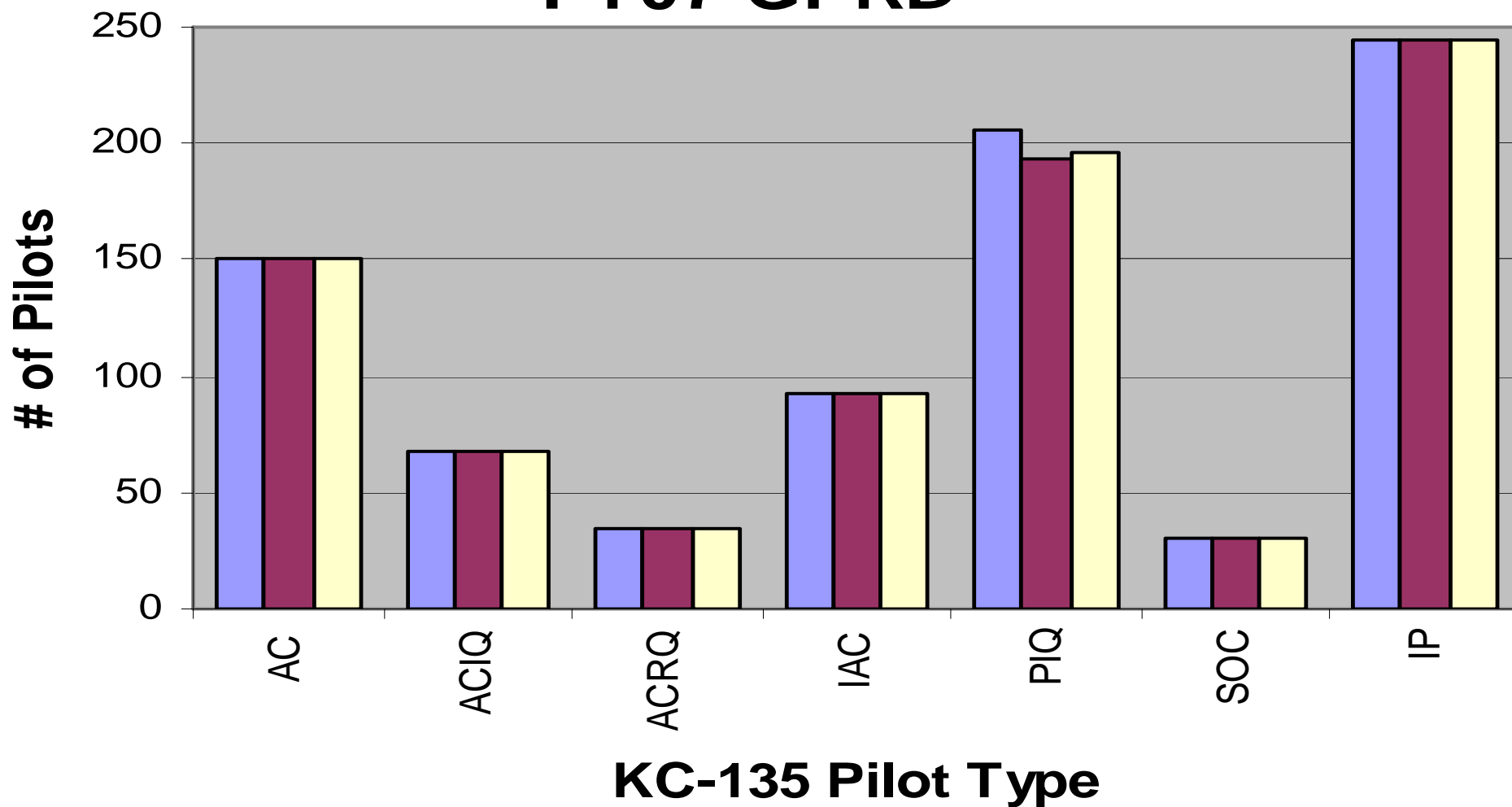
Simulation Results

KC-135 FY07 GPRD Entry/Grad



AETC

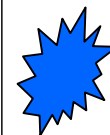
FY07 GPRD



Entry

Baseline

Baseline w / Aux ALZ





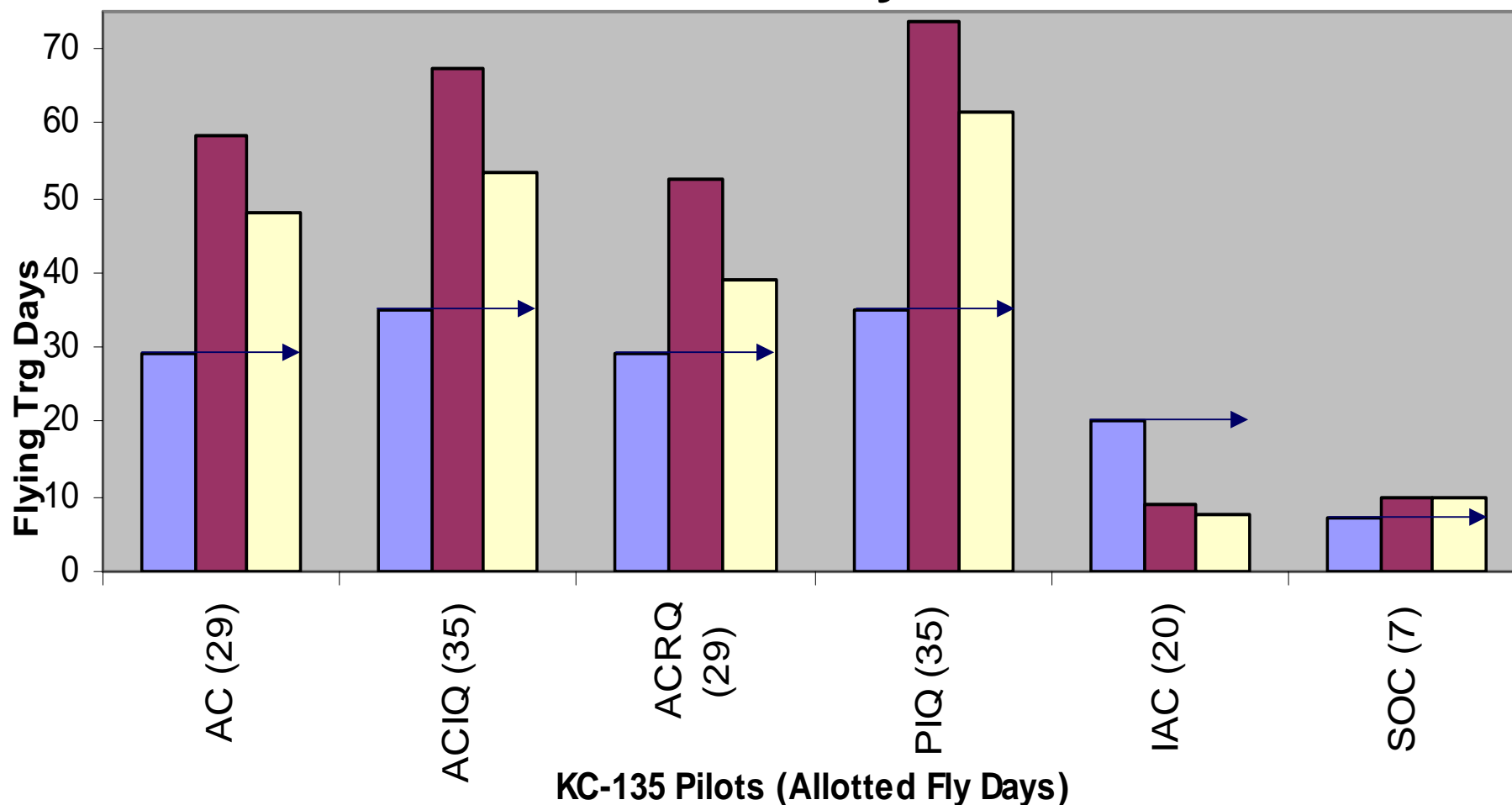
Simulation Results

KC-135 FY07 TiS Comparisons



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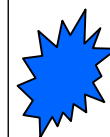
FY07 Time In System



■ Max Desired Flying Days

■ Baseline

■ Baseline w/ Aux ALZ





Simulation Results

TiS Decrease w/ Aux ALZ x GPRD



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Pilot Type (FY07 GPRD)	TiS decrease	TiS decrease x GPRD
C-17 AC (154)	12.0	1855
C-17 ACAD (40)	6.9	278
C-17 ACIQ (94)	12.8	1199
C-17 ACRQ (18)	5.8	104
C-17 CAD (80)	7.2	577
C-17 PIQ (392)	26.6	10432
C-17 IAC (114)	26.2	2989
C-5 ACAR (12)	2.9	34
KC-135 AC (150)	10.2	1532
KC-135 ACIQ (68)	14.0	950
KC-135 ACRQ (34)	13.4	456
KC-135 PIQ (206)	12.1	2502
KC-135 IAC (92)	1.1	106
TOTAL	151.3	23015



Results



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- The model shows the TiS requirement for C-17 and KC-135 pilots cannot be met with current resource availability
- FY07 TiS is improved for all 3 platforms with the addition of an Aux ALZ
- Overall C-17 and KC-135 Baseline TiS implies saturation



Conclusion



- Given the resource capacity and the current GPRD requirements applied to the model, coupled with the Time in System output
 - The Altus AFB simulation model shows pattern saturation
 - Requirement exists for an additional ALZ at Altus AFB



Future Studies



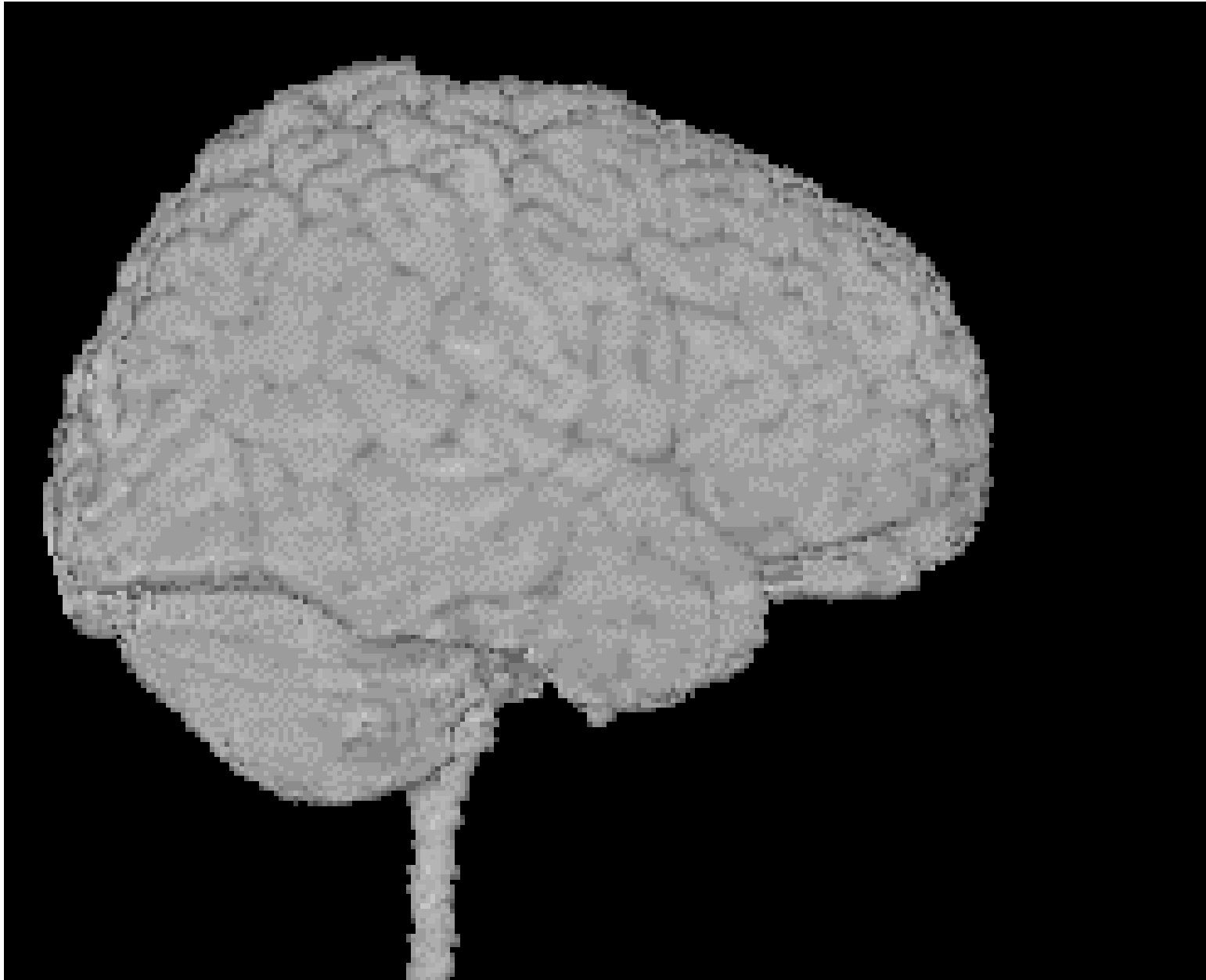
- Model additional C-17 Abeam constraints
- Clarify the high speed tactical approach and the NVG command responsibility training standards for model inclusion



Questions???



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Back-up Slides



Assumptions Start



Assumptions General



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- Sorties greater than 99 minutes = 10 min standard deviation
- Sorties less than 99 minutes = 5 min standard deviation
- Aerial Refueling time to and from RP is 80 minutes
- No student reflly sorties modeled for KC-135
- Senior Officer Course (SOC) sorties are all during daytime and no reflies required
- Reflies have priority over "new class"



Assumptions General



- Pilots usually fly in pairs, odd pilots can fly in singles
- Global Weather – No-fly weather occurs based on historical average(~3%) (Altus Wx Shop); lasts ½ to 1 day with equal probability
 - C-17 does not take off w/ low ceiling--2-4 hrs delay
- Fifteen-minute taxi-out and an additional fifteen-minute taxi-in incurred before and after each sortie (not counted as flying hours), respectively
- Time in System (TiS): Training days required to accomplish flying training



Assumptions General



- Schoolhouse Flying Window: 0830-0230
- Training days = 246
- AR resource capacity not affected by C-17 tactical maneuvers
- Altus receivers have priority over non-Altus receivers for AR
- SOC sorties all accomplished at Altus and always Priority 1
- IP sorties accomplished at Altus



Assumptions

C-17



- Staggered take-off calculated as follows:
 - 1st available C-17 is ready at 0830
 - 2nd available C-17 is ready at 17 minutes (0847) into the start of operation, then 15 minute interval for other C-17s
- When the VFR rwy is used for C-17 tactical at Altus, the following resource capacity decrease occurs:
 - VFR = 2
 - IFR & LL = 0



Assumptions

KC-135



AETC

- Most evaluation sorties are flown during daylight hours
- IAC sorties are flown anytime
- AC, ACRQ, ACIQ, & CIQ sorties - 1st 2 sorties are during daylight hours, next 2 are during nighttime hours, remaining sorties can be flown anytime



Assumptions

KC-135



- Staggered take-off is calculated as follows:
 - First KC-135 ready 7 minutes (0837) into the start of operation. The 2nd to 5th aircraft becomes available in 15-minute intervals. The 6th to 10th aircraft becomes available in 7.5-minute intervals.
- 25% of all sorties will fly off-station except for SOCcs and IPs



Assumptions

BASH/Day/Night



- Occurs in Dec-Jan 1700-1859 hours
- Daylight hours are 0830-1759 (non BASH months)
- Daylight hours are 0830-1659 (BASH months)
- Nighttime hours are 1800-0230 (non BASH months)
- Nighttime hours are 1900-0230 (BASH months)



Assumptions

Resource Capacity



Resource	Capacity
C-17 Fleet	6 to 8
C-5 Fleet	2
KC-135 Fleet	10
KC-135 AR Tnkr Track	4
Rcvr AR Track	4
Sooner ALZ Pattern	3
Additional Tanker Track	4
LL Pattern	Infinite
IFR Pattern	8
VFR Pattern	4
Tactical Pattern (C-17)	2



Assumptions End



Model Snap-shots



Main Logic



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C-17 SET



↓ C-17 Logic



↓ Wx Logic

KC-135 SET



↓ KC-135 Logic



↓ Time Dependent Logic

C-5 One



↓ Air Refueling Logic



C-5 Two



↓ C-5 Logic



KC-135 Logic



AETC

KC-135 Logic

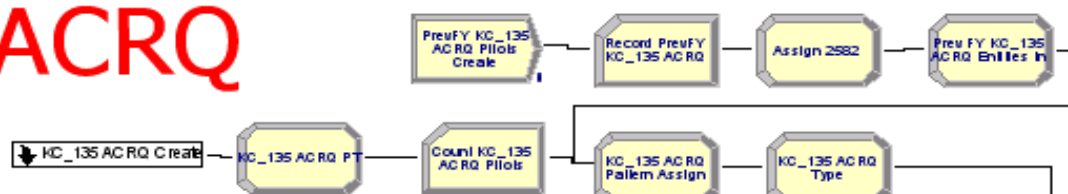
TNOW

08:30:00

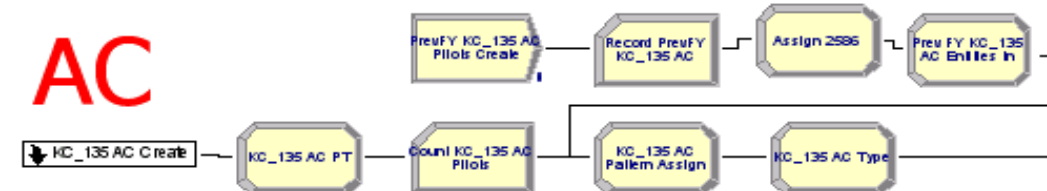


1 = Day Time
2 = Night Time

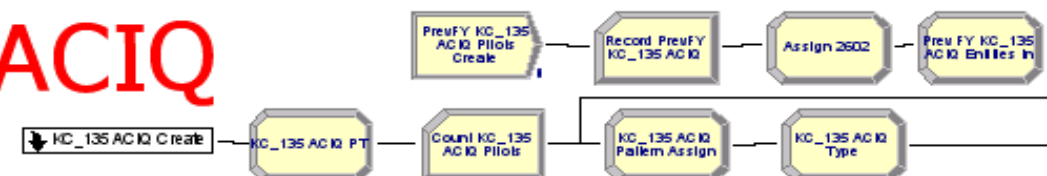
ACRQ



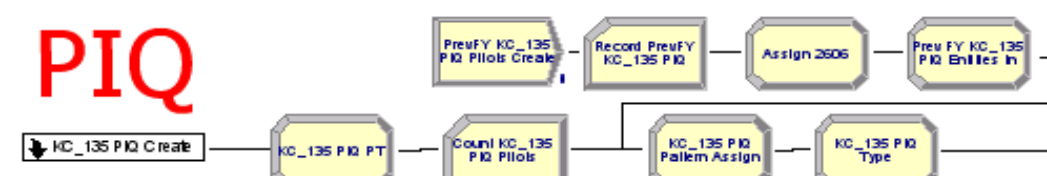
AC



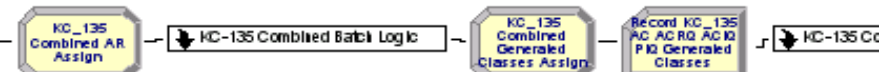
ACIQ



PIQ



KC_135 Combined Generated Class



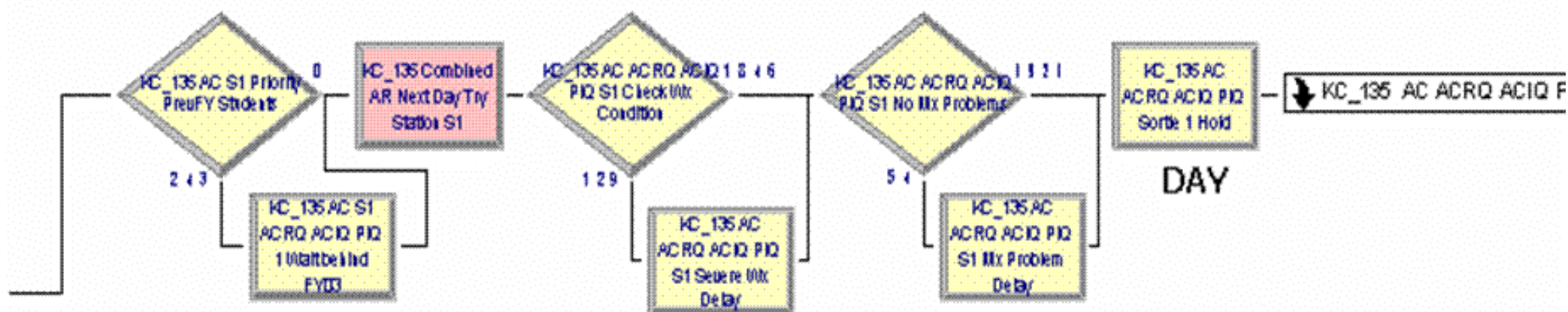
of Classes generated after pairing up pilots



Prior to Sortie Check



AEFC



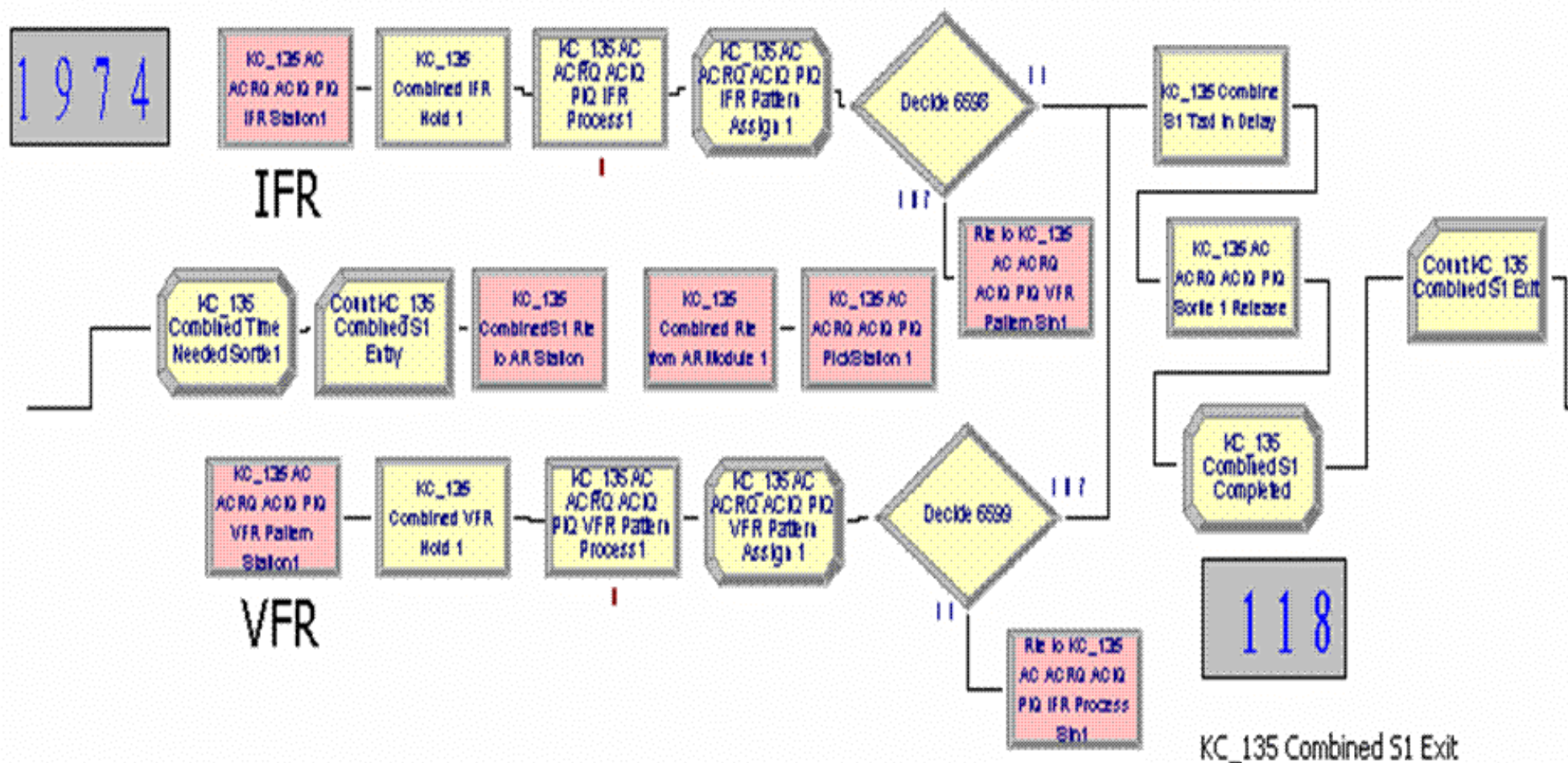


Sortie Profile



AEETC

KC_135 Combined S1 Entry





AR Logic



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Air Refueling Logic

12:48:53

Number Busy

VFR	IFR	LL	Tactical	Altus AR
1	1	0	0	0

Current Availability

VFR	IFR	LL	Tactical	Altus AR
3	7	20	2	4

Rows (Queue 1)

Trucks (Queue 2)

Separate Rows from Trucks to determine VFR Ault to send

Current Ault Available for Use

IC-07	IC-03B	IC-06
8	1	0

IRC - Run for Controller
VFR - Multiple Signal

4491



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Glossary



Acronyms/Abbreviations



- AC – Aircraft Commander Upgrade
- ACAD – Aircraft Commander Airdrop
- ACAR – Aircraft Commander Air Refueling
- ACIQ – Aircraft Commander Initial Qualification
- ACRQ – Aircraft Commander Requalification
- AETC – Air Education and Training Command
- AFB – Air Force Base
- ALZ – Assault Landing Zone
- AMC – Air Mobility Command
- AMW – Air Mobility Wing
- AR – Air Refueling
- BASH – Bird Aircraft Strike Hazard
- CAD – Copilot Airdrop
- FY – Fiscal Year
- GPRD – Graduate Programmed Requirement Document
- IAC – Instructor Aircraft Commander Qualification
- IFR – Instrument Flight Rules
- IP – Instructor Pilot
- KPP – Key Performance Parameter



Acronyms/Abbreviations



- LL – Low Level
- Mx – Maintenance
- NVG – Night Vision Goggles
- PCO – Pilot Check-out
- PIQ – Pilot Initial Qualification
- Qtr – Quarter
- Rwy – Runway
- SAS – Studies and Analysis Squadron
- SOC – Senior Officer Course
- TPS – Tactical Proficiency Sortie
- VFR – Visual Flight Rules
- Wx - Weather
- XP – Plans and Programs